

Roll No. ....

May-08

Total No. of Questions : 09]

[Total No. of Pages : 03

## Paper ID [CE303]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 5<sup>th</sup>)

MAY 2008

### DESIGN OF STEEL STRUCTURES - I (CE - 303)

Time : 03 Hours

Maximum Marks : 60

#### Instruction to Candidates:

- 1) Section - A is **Compulsory**.
- 2) Attempt any **Four** questions from Section - B.
- 3) Attempt any **Two** questions from Section - C.

#### Section - A

Q1)

(10 × 2 = 20)

- a) What is effective length of the fillet weld? How much effective size of weld is considered if the effective length is less than 4 times the weld size?
- b) Why the flange of a plate girder curtailed?
- c) On what factors permissible compressive stress in steel depends?
- d) What is the minimum thickness of a plate girder when it is exposed to weather but accessible for painting?
- e) What is the recommend value of minimum and maximum inclination of a lacing bar?
- f) Write any TWO disadvantages of bolted connections.
- g) Write the formula for computing thickness of square base of a solid round steel column.
- h) Define Impact factor.
- i) Taking  $k_1 = k_2 = k_3 = 1$ , compute design wind speed for a truss located in Coimbatore.
- j) What is the recommended value of effective length of a compression member if it is effectively held in position at both ends, but not restrained against rotation. The unsupported length is 5 m.



### Section - B

(4 × 5 = 20)

- Q2)** A tie in a truss of 2 ISA 90 × 60 × 10 mm is welded on either side of 12 mm gusset plate through the longer legs. Design the welded joint if permissible stresses in angle and fillet welds are 150 MPa and 107 MPa respectively.
- Q3)** Design a compound column to carry an axial load of 650 kN. The column consists of two channels placed back to back and laced together. Take effective length = 5 m.
- Q4)** A hall 12 m × 8 m has to be provided with a 120 mm thick roof slab. The roof shall also be provided with 75 mm thick line concrete. The live load on the slab is 1.5 kN/m<sup>2</sup>. Design an intermediate steel beam, if the beams are spaced at 3 m centres.
- Q5)** Design the tension member of a truss which carries a tensile load of 300 kN. Design the section which shall consist of Tee Section. The flange of Tee is connected to the gusset plate by 20 mm diameter rivets.
- Q6)** A welded plate girder has a simply supported span of 20 m. It carries a uniformly distributed load of 400 kN/m inclusive of its weight. The depth of plate girder is restricted to 1600 mm. Design a suitable section.

### Section - C

(2 × 10 = 20)

- Q7)** An ISHB 250 @ 54.7 kg/m with cover plates 300 mm × 20 mm is used as a column for supporting load of 1600 kN (inclusive of self weight). Design a gusseted base plate for the column.  
Take bearing strength of concrete = 4 MPa  
Bending stress = 185 MPa  
Shear stress = 100 MPa  
Bearing strength = 300 MPa  
Diameter of rivets = 18 mm.
- Q8)** Design a steel roof truss as shown in Fig 1 for a clear span of 12 m. The truss is supported over masonry columns 45 cm × 45 cm. The trusses are placed 3 m c/c and support galvanised iron sheet on rafters and steel purlins. The rise of the truss is  $\frac{1}{3}$  of span and the wind normal to the roof surface is 1500 N/m<sup>2</sup>.



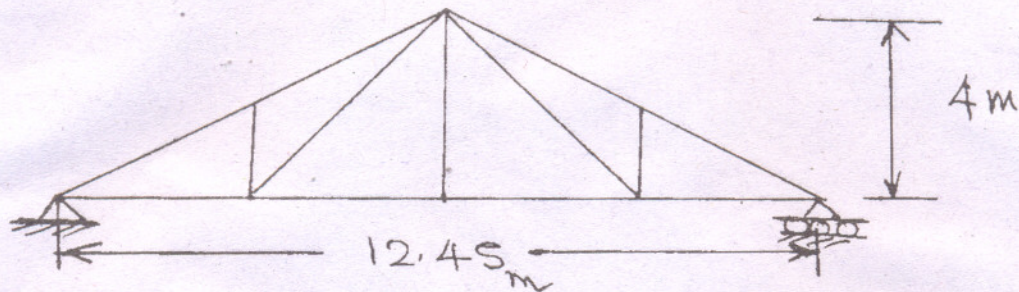


Fig. 1

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Q9) Write short notes (any TWO):

- (a) Design of purlins.
- (b) Intermediate Stiffness.
- (c) Design of columns using battening system.